

Description of Geologic Map Units Sanpete Valley, Sanpete County, Utah

Qal	Alluvium (Holocene) - <i>Dark-brown to gray, thin- to thick-bedded, locally massive, cross-bedded unconsolidated sediments. Consists of clay, silt, sand, and gravel of fluvial origin. Deposits form narrow to broad, even surfaces of low relief. Thickness varies; generally less than 50 feet (15 m) thick.</i>
Qcl	Colluvium (Holocene) - <i>Brown to dark-brown, heterogeneous, unsorted mixture of fragments that locally mantles lower valley walls and accumulates at the base of some steep cliffs. Unconsolidated to semi-consolidated. Thickness varies, and is up to 50 feet (15 m).</i>
Qf	Alluvial-fan deposits (Holocene) - <i>Light-brown to brown, locally gray, unconsolidated to semi-consolidated, moderately well-sorted silt, sand, and gravel at stream-canyon mouths. Deposits commonly lobate. Thickness uncertain, probably as much as 50 feet (15 m) locally.</i>
Qcf	Coalesced alluvial-fan deposits (Holocene) - <i>Brown to dark-brown or gray, thin- to thick-bedded, commonly cross-bedded, unconsolidated to semi-consolidated sediments of fluvial origin. Consists of silt, sand, granules, pebbles, cobbles, and sparse boulders. Formed as a result of the overlapping and interfingering of adjacent alluvial fans; forms broad, low, sloping aprons at the feet of adjacent highlands. Thickness uncertain.</i>
Qvf	Valley-fill deposits (Holocene) - <i>Light-brown to brown, unconsolidated, interbedded clay, silt, sand, and gravel. Lithologies reflect rocks exposed on adjacent hills. Thickness ranges from 0 to as much as 25 feet (0-8 m) near basin center.</i>
Qsw	Slope-wash deposits (Holocene) - <i>Light- to dark-gray, unconsolidated to weakly cemented, thin- to thick-bedded, faintly cross-bedded detritus of fluvial origin. Consists of clay, silt, sand, and some gravel. Forms broad, gently sloping sheets. Thickness up to 25 feet (8 m).</i>
Qtu	Tufa deposits (Quaternary) - <i>Light-gray to light-tan, low, rounded mounds of calcium carbonate. Consists of thin, soft, cellular, porous layers. Deposit encircles spring that formed along a major high-angle normal fault that extends along the east from of the San Pitch Mountains.</i>
Qe	Earthflow deposits (Quaternary) - <i>Brown to dark-brown, unconsolidated to semi-consolidated sand and gravel in an unsorted matrix of clay and silt. Consists of masses of debris that flowed downslope to form elongate, hummocky, lobate landforms. Thickness varied widely; probably as much as 150 feet (45 m) thick locally.</i>
Ql(Tg)	Landslide blocks of Green River Formation (Quaternary) - <i>Coherent blocks and detritus of the Green River Formation (Tg) that have slid into their present position along a westward-sloping glide plane.</i>
Ql	Landslide deposits (Quaternary) - <i>Brown to dark-brown and gray, heterogeneous mixture of rocks and sediments. Forms irregular to lobate masses of bedrock that have slid downslope to form chaotic, hummocky accumulations of rubble. Some deposits form concentric ridges. Thickness varies widely; may be as much as 150 feet (45 m) thick locally.</i>
Qrs	Rockslide deposits (Quaternary) - <i>Light-gray to brown unconsolidated and unsorted accumulation of angular boulders on steep slopes. Hummocky, locally lobate. Ranges in thickness from about 10 feet to as much as 150 feet (3-45 m) thick locally.</i>
Qof	Older alluvial-fan deposits (Quaternary) - <i>Gray to dark-gray, thin- to thick-bedded, prominently cross-bedded, unconsolidated sediment of fluvial origin. Consists of silt, sand, and gravel, with minor lenses of cross-bedded sand. As much as 200 feet (60 m) thick.</i>
Qmw	Mass-wasting deposits (Quaternary) - <i>Brown to dark-brown, heterogeneous masses of mixed country rock that moved downslope. Thickness varies and probably does not exceed 200 feet (60 m).</i>
Qt	Glacial till (Pleistocene) - <i>Brown to dark-brown masses of unsorted, unconsolidated to semiconsolidated morainal rubble, from clay to boulder size. Minor exposures in the Sanpete Valley area, limited to the southeastern part of the map.</i>
Qao	Older alluvium (Quaternary) - <i>Much like alluvium (Qal) in color, bedding, and composition. Forms small discrete masses of fluvial origin above adjacent valley floors. Thickness ranges from about 10 to 200 feet (3-60 m).</i>

QUATERNARY AND TERTIARY DEPOSITS

QTcf	Coalesced alluvial-fan deposits (Holocene to Pliocene?) - <i>Brown to dark-brown or gray, unconsolidated to semi-consolidated, thin- to thick-bedded, commonly cross-bedded sediments of fluvial origin. Deposits consist of silt, sand, and gravel. Formed by the overlapping and interfingering of adjacent alluvial fans; forms broad, low sloping apron at foot of adjacent highlands. Thickness uncertain; possibly as much as 100 feet (30 m) thick locally.</i>
QTpm	Pediment mantle (Holocene to Pliocene) - <i>Light-brown to brown, gray, or locally reddish-brown, unconsolidated to well-cemented, massive to crudely bedded sediments. Consists of a poorly bedded mixture of silt, sand, and gravel derived from adjacent uplands. Surfaces are even and slope gently away from the uplands. Ranges in thickness from about 10 feet to more than 150 feet (3-45 m).</i>

TERTIARY DETACHMENT BLOCKS

T(Tch)	Displaced block of the Oligocene(?) Crazy Hollow Formation (Tertiary) - <i>Unbroken block of the Crazy Hollow Formation (Tch) carried "piggyback" to its present position, during either Oligocene(?) or Miocene time, on a block of the Green River Formation that slid valleyward.</i>
T(Tg)	Displaced block of the Eocene Green River Formation (Tertiary) - <i>Unbroken block of the Green River Formation (Tg) that slid into its present position, during either Oligocene(?) or Miocene time, along a westward-sloping glide plane.</i>

TERTIARY SEDIMENTARY ROCKS

Tch	Crazy Hollow Formation [of Speiker, 1949] (Oligocene?) - <i>Red to reddish-brown, light yellow-brown lenses, and locally white sandstone; shaly siltstone, and some conglomerate; locally gray, pink, and dark-gray to black, thin, dense limestone beds. Ranges in thickness from 0 to 160 feet (0-50 m).</i>
Green River Formation (Eocene)	
Tg	Western part of the Wasatch Plateau and areas to the west - <i>Consists of limestone underlain by shale. Thickness of formation ranges widely, from about 500 to 1,200 feet (150-365 m).</i>
Limestone unit - <i>White to yellowish-gray to yellowish-brown to light-brown, thin- to thick-bedded, even-bedded limestone and minor thin beds of sandstone and tuff. Limestone beds are dense, thinly laminated, and commonly oolitic; some thin limestone beds are stromatolitic and contain ostracods.</i>	
Shale unit - <i>Light-green to grayish-green, thin-bedded, fissile, somewhat calcareous shale and sparse interbedded micritic limestone, siltstone, and sandstone.</i>	

TERTIARY SEDIMENTARY ROCKS (continued)

Tc	Colton Formation (Eocene) - <i>Mostly claystone and mudstone variegated in shades of reddish brown, light greenish gray. Locally includes beds of yellowish-gray to yellowish-brown siltstone and channel-fill sandstone and reddish-brown conglomerate, as well as sparse, interlayered, thin beds of platy, light-gray, dense, finely crystalline limestone. Of fluvialite and lacustrine origin. Ranges in thickness from 325 to 850 feet (100-260 m).</i>
Tf	Flagstaff Limestone (Eocene and Paleocene) - <i>Light-gray to yellowish-gray to light-brown, thin- to thick-bedded, locally massive, fine-grained, dense limestone and minor dolomite containing some algal nodules. Red to pink near subjacent red units of Jurassic age. Contains subordinate interbedded dark-gray, gray and greenish-gray calcareous shale. Oncolite-rich limestone beds locally abundant. Forms resistant ledges and prominent hogbacks. Ranges in thickness from 0 in the central part of the San Pitch Mountains to about 1,000 feet (305 m) on the Wasatch Plateau.</i>

TERTIARY EXTRUSIVE IGNEOUS ROCK

Tm	Moroni Formation (lower Oligocene to upper Eocene) - <i>Volcaniclastic and pyroclastic rocks, including ash-flow tuff, welded tuff, and fluvial conglomerate and sandstone. Tuff commonly is porous and friable, but locally includes light-gray, gray, brown, light-red, and greenish-gray rhyolitic welded tuff containing rounded andesite clasts. Conglomerate beds are crudely bedded and commonly poorly sorted and contain quartzite and limestone clasts. Thickness varies; maximim thickness is about 2,000 feet (610 m) (Cooper, 1956, p. 21).</i>
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TERTIARY AND MESOZOIC SEDIMENTARY ROCKS

TKn	North Horn Formation (Paleocene and Upper Cretaceous) - <i>Red to reddish-brown mudstone, claystone, sandstone, conglomeratic sandstone, conglomerate, and minor limestone. Mudstone is thick bedded to massive; sandstone varies from thin to thick bedded, commonly cross-bedded, and is fine to medium grained. Limestone beds are thin and dense. Minor coal beds and carbonaceous seams are present along east flank of the San Pitch Mountains near Wales. Formation is unstable and is marked by many slumps, landslides, and earthflows. Ranges in thickness from about 500 to 3,000 feet (150-915 m).</i>
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MESOZOIC SEDIMENTARY ROCKS

CRETACEOUS

Kpr	Price River Formation (Upper Cretaceous) - <i>Gray to light-gray, thin- to thick-bedded, locally massive, commonly well-cemented conglomerate, conglomeratic sandstone, and sandstone with minor shale. Sandstone is fine to coarse grained. Ranges in thickness from 0 to about 1,200 feet (0-365 m).</i>
Kc	Castlegate Sandstone (Upper Cretaceous) - <i>Brownish-gray, locally conglomeratic, irregularly bedded, massive, fine- to coarse-grained sandstone. Locally includes some thin, dark-gray, shaly siltstone and carbonaceous shale. Ranges in thickness from about 50 to 500 feet (15-150 m).</i>
Ki	Indianola Group, undivided (Upper Cretaceous to Lower Cretaceous)

San Pitch Mountains - *Reddish-brown and gray, thick-bedded to massive, well-cemented conglomerate. Consists of sand, granules, pebbles, and well-rounded cobbles of white, purple, green, grayish-green, and light-brown quartzite, light-brown to light-gray chert, white quartz, and some gray to dark-blue limestone. Ranges in thickness from 100 to 15,000 feet (30-4,570 m).*

Stratigraphic units near Birch Creek southwest of Fountain Green and mapped as part of the Indianola Group on the Nephi quadrangle, have been previously mapped as the South Flat Formation (Hunt, 1950, 1954). These beds are light-brown, brown, and grayish-brown, medium-grained, quartzose sandstone with intercalated conglomerate. Sandstone beds are even bedded and vary from thin to thick bedded, with locally discontinuous coal seams and carbonaceous material; limonite stained. These beds may be correlative with the Blackhawk Formation. As much as 2,850 feet (870 m) thick (Hunt, 1950, p. 60).

Cedar Hill - *Divisible into four interbedded marine and nonmarine units correlative with the following formations as exposed in Sixmile Canyon (near Sterling), along the west flank of the Wasatch Plateau (in descending order): Sixmile Canyon formation (conglomerate, conglomeratic sandstone, and sandstone), Funk Valley Formation (conglomeratic sandstone and sandstone), Allen Valley Shale, and Sanpete Formation (conglomeratic sandstone and sandstone).*

Kbh	Blackhawk Formation (Upper Cretaceous) - <i>Sandstone, shaly siltstone, shale, carbonaceous shale, and coal. Sandstone beds are light gray, light brown, brownish gray, thin to medium bedded, cross-bedded, and fine to medium grained. Many thin to thick coal zones are in the lower part. Ranges in thickness from about 700 to 1,000 feet (200-305 m).</i>
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CRETACEOUS AND JURASSIC

KJu	Cretaceous and Jurassic strata, undivided - <i>Includes units assigned as Morrison(?) Formation (Speiker, 1946) and Cedar Mountain Formation. Includes conglomerate, sandstone, mudstone, and limestone. Reddish-brown, medium-bedded to massive, and cross-bedded conglomerate. Reddish-brown to very light-gray, thin- to medium-bedded, cross-bedded, fine- to coarse-grained sandstone. Cedar Mountain Formation is massive to thick-bedded mudstone, variegated purple, red, gray and green. Contains sparse, interleaved, discontinuous, thin beds of conglomerate, sandstone, and freshwater limestone.</i>
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JURASSIC

Jtg	Twist Gulch Formation (Middle Jurassic) - <i>Reddish-brown, thin- to medium-bedded, fine-grained sandstone, shaly siltstone, and shale. Thickness estimated at about 3,000 feet (915 m) (Hardy, 1952, p. 23).</i>
Ja*	Arapien Shale (Middle Jurassic) - <i>Calcareous mudstone, thin to medium bedded; even bedded, locally amorphous; generally light gray marked by pale-red blotches, but, in places, wholly drab gray or wholly reddish brown. Includes intercalated, thin, lenticular beds and seams of yellowish-gray to light-brown siltstone and sandstone and sparse limestone beds. Contains thick beds of halite, gypsum, and other evaporites. Formation is complexly deformed. Thickness uncertain; estimates range from about 4,000 feet (1,220m) to as much as 13,000 feet (3,960 m).</i>

*Witkind and Weiss (1987) map this unit as T(Ja) based on their interpretation that salt within the unit has been moving since deposition and continued into the Tertiary.



Modified from Witkind and others (1987) and Witkind and Weiss (1991)